

Introduction

How Do Ships Navigate From Place To Place At Sea?



Source: San Francisco Maritime National Historical Park, J9.24,359.28.

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Navigator with Sextant

To take advantage of the trade possibilities offered by water, people needed to learn how to survive the seas. In the early years of San Francisco, having limited connections between the east and west coasts of America, most goods and people came and went by water. With only primitive roads and limited railroad lines, the west coast relied on ships for both domestic and international transport well into the 1900s. This lesson explores navigation, an important skill necessary for finding the way from one place to another at sea.

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Focus Question: How Do Ships Navigate from Place to Place?

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Source: San Francisco Maritime National Historical Park, J9.16, 868.

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How do ships navigate from place to place?

Imagine you are this sailor and you are sailing from Boston or New York. How do you and the captain safely navigate the ship to California? How do you figure out which direction to steer your ship, especially when you can no longer see the shoreline? How do you locate the position of your ship on a nautical chart (map)? Skilled navigators helped to make safe travel by water possible, and as a result the maritime trades prospered.

Setting the Stage: How Do Ships Navigate from Place to Place?

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The essentials of modern navigation had been well established by the 1770s, when Europeans first settled on the West Coast of North America. The sextant, a practical tool for celestial (sky) navigation, was in common use. The chronometer (an accurate clock) had been invented but had not yet become widely used. Nautical charts had become more accurate.

The nature of the West Coast makes it very important that navigation is accurate. The West Coast is called a lee shore because receives the full force of the westerly winds coming off of the Pacific Ocean. The summer fogs, often lasting for days without a break hide the entrances to the few useful harbors. The long list of shipwrecks proves the difficulties of the coast. The conditions call for a high standard of skill among navigators.

Navigators find their position on the earth's surface by observing the location of the stars. They need several things to do this:

- An angle-measuring instrument called a sextant, to measure the angle of the stars above the horizon.
- A chronometer for telling time.
- Accurate charts so the navigator can find the position of the ship in latitude and longitude or in reference to the land or a hazard such as rocks and shallow water called shoals.
- The navigator needs a quick and easy mathematical method for using the data from their observations of the stars to mark the position of the ship on the chart.

Additional Resources

<http://www.mariner.org/exhibits/women/goingtosea/whither.htm>

The Mariner's Museum

"Whither You Go I Shall Go"-Merchant and Whaling Wives

This site provides a rich background about the role women played in maritime history.

There is information on women in navigation, sea captain's wives, and lighthouse keepers. Look for the section on the home page about Mary Patten. Use the information in this section for further research about Mary Patten.

<http://www.shining-sea.org/memorial.html>

Shining Sea Foundation

This site describes the Mary Patten Memorial and gives information about her life as a sea captain's wife.

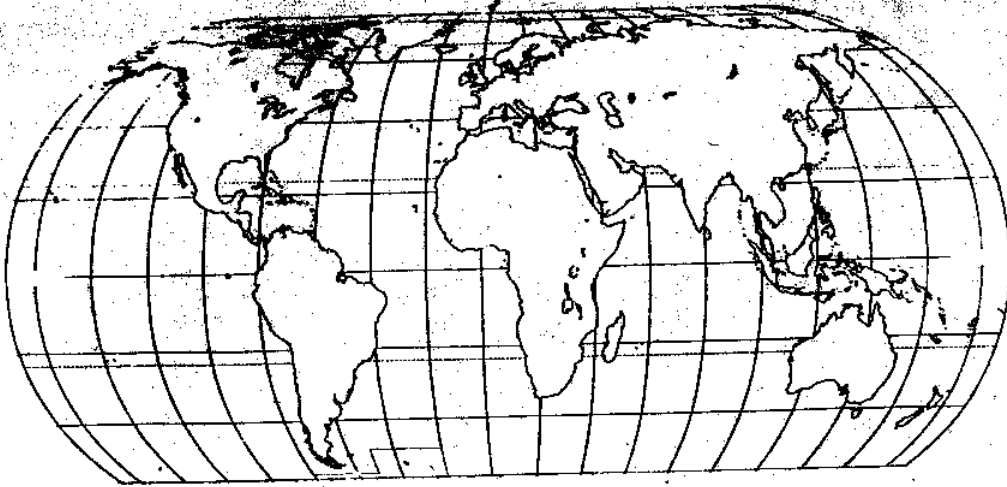
<http://www.shining-sea.org/downeast.html>

Shining Sea Foundation

This site provides a reproduction of the article printed in the Down East Magazine 1959. It recounts Mary Patten's journey on *Neptune's Car* as she served as navigator and sea captain for her sick husband.

Map Challenges: How Do Ships Navigate from Place to Place?

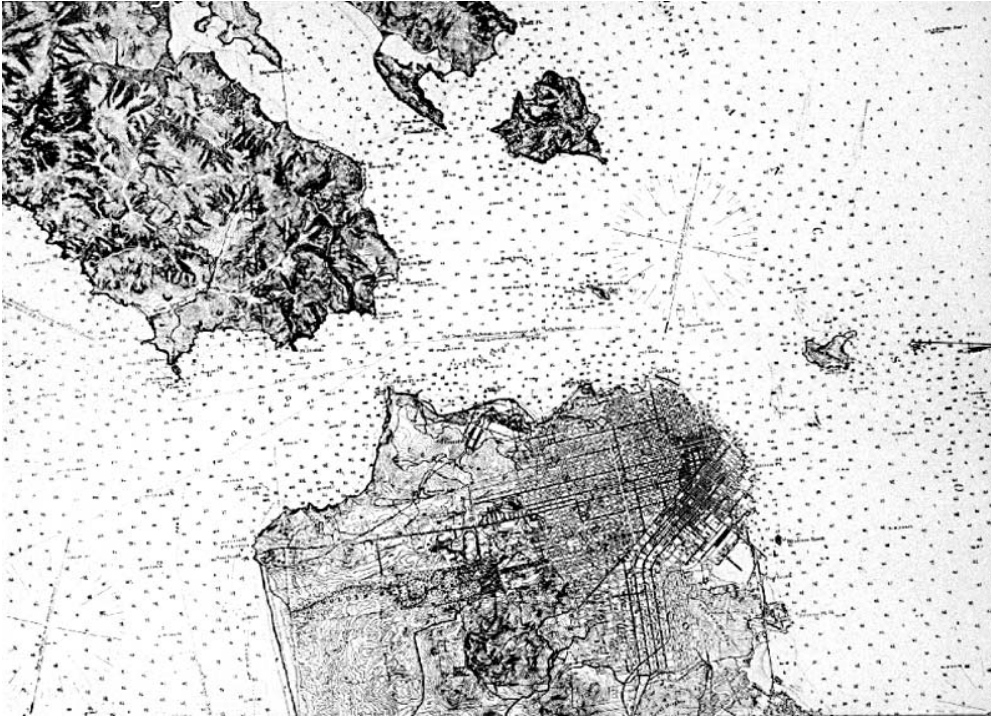
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Using this map, prepare your own chart for navigation.

1. Use a red marking pen to identify the lines of latitude.
2. Use a blue marking pen to identify the lines of longitude.
3. Use a green marking pen to identify the equator.
4. Identify Cape Horn with a red dot.
5. Look up the latitude and longitude of the San Francisco Bay Area.

Map Challenges: How Do Ships Navigate from Place to Place?



Source: San Francisco Maritime National Historical Park.
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This is a 1883 United States Coast navigational chart. On the bottom half of the map is the San Francisco peninsula. On the top half is Marin County. Look carefully and find the directional compass within the bay waters. The dots marking the bay provided information to navigators. They are numbers that show the depth of the water.

Was it possible to walk from San Francisco to Marin County in 1883?

Can you do it today?

Seaside Story: A Brave Guide through the Seas

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A Brave Guide Through the Seas

In the year 1856, shortly after Mary Patten's 19th birthday, she found herself to be captain of the great clipper ship, *Neptune's Car*. Mary and her husband, Joshua A. Patten, a 26 year old clipper ship captain from Rockland, were married in Maine on April 1, 1853. Mary was a beautiful 16-year-old then and she was a native of Boston.

Shortly after their marriage, Mary's new husband, Joshua, became the captain of one of the fastest clipper ships afloat, *Neptune's Car*. These clipper ships were the racing cars of the seas, known as the fastest sailing vessels in the world. Their captains needed to be skilled and bold. Advertisements for these clipper ships boasted of making the trip around the Horn to the Golden Gate of San Francisco in only 89 days. Such a trip in any other type of ship have taken twice as long. But, often times the sheer speed of a ship could not overcome the hazards on the 15,000-mile voyage, especially the stretch around the dreadful Cape Horn.

The sea captains had to have complete command of the crews who were generally tough, hard working men. These sailors lived under terrible conditions onboard the ships where wages were low, the food was poor, and the work was hard. These conditions put a huge burden on the captains to be not only skilled sailors and navigators, but to also be strict disciplinarians. Often times the relationship between the captain and the crew was difficult. Even so, some sea captains sailed with their wives and children on board even under these difficult conditions.

Mary Patten was prepared to bear the hardships at sea just to be with her husband and to help him with his job. She made a voyage the year before and her husband taught her to navigate. Mary learned quickly and was a good navigator. Mary Patten would soon find out just how valuable her knowledge of navigation would prove to be on the voyage to California.

It all began at the port of New York on a hot July day as *Neptune's Car* set out for California. Although everything seemed to be fine on the surface, trouble began to brew early in the trip. Captain Patten wanted to arrive in California ahead of the other ships that also set sail that day. Shortly after they left New York, he caught the first mate sleeping during half of his

watch on the quarterdeck. The first mate kept the ship under reefed (shortened) sails, so he could sleep instead of work. A ship with reefed sails would move much slower than the captain wanted. It also meant that the other ships that left port on the same day would get to California first.

Once Captain Patten discovered what the first mate was doing, he removed him from his duties and took over the first mate duties himself. The first mate got so angry about this action that he became unruly and had to be put in irons. His wrists were bound with iron cuffs that were chained together.

Thus the captain had to work day and night, navigating and sailing the ship. He refused to go below to his cabin to rest. Captain Patten's ship, *Neptune's Car*, was off Cape Horn for 18 days in strong westerly winds, called gales. But before the ship pulled away from the terrible storms there, Captain Patten fell ill. Completely exhausted, he staggered to his cabin telling his wife, Mary, that his head ached terribly and that he felt feverish.

Mary Patten read the ship's medical book for advice and started to take care of her husband. He just got weaker and sicker no matter what Mary did. At one point he went blind and deaf. Mary knew they needed to get to San Francisco as soon as possible to save him. She was in a very bad situation. The first mate could not be trusted to sail the ship and her husband was seriously ill. There was nothing left for her but to save the ship, the crew, her husband, and herself. So she put her navigation skills to work immediately.

After Mary told the crew that she would serve as the captain of *Neptune's Car* for the remainder of the voyage, the first mate tried to turn everyone against her. "She is a woman." He said. "What would a woman know about sailing a ship and holding her on course?" His remarks did not stop her. Mary had the first mate locked up in irons again and she took over the ship as captain.

The crew stayed loyal to Mary and obeyed all of her commands. They knew she would get them to San Francisco safely and quickly. She wanted to save her husband and get him to a doctor in San Francisco as quickly as possible. He was indeed very ill. The second mate, Mr. Hare, helped her sail the ship.

Mary was a gifted navigator. She was able to hold the ship on a very tight course that would get them to San Francisco in good time. As they rounded

Cape Horn, snow squalls, ice storms, and violent winds buffeted the ship. The gales came through with deafening force. Mary was up day and night taking navigational readings with her sextant during the day whenever there was a break in the cloud cover that settled in around them. She did not even change her clothes for 50 days and nights. All she did was care for her husband, navigate with her sextant, and keep watch over the ship's course.



Source: San Francisco Maritime National Historical Park, J9.24,359.28.
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During this time, Mary knew she was pregnant and expected her first child the following March. She still kept up the difficult pace she had set on the journey.

Often Mary would come up to the deck from the cabin and find the rigging on the sails to be heavy with icicles. As they were drenched in salt water from the waves crashing over the ship decks and in rainwater coming from the stormy skies, the lines would instantly freeze from the icy winds blowing across the decks. The ship climbed up and crashed down the enormous waves of over 50 feet. It was all the crew could do to hold *Neptune's Car* on the tight course Mary set for them.



This painting of Mary Patten by Gordon Johnson is owned by Atlantic Mutual Companies, one of the group that insured Neptune's Car. Founded in 1842 as Atlantic Mutual Insurance Company, they have historical records that value the ship at \$104,620.

Once they had rounded Cape Horn, everyone on board relaxed. They moved up the coast of South America well, but once the coastline of Baja, California was sighted, this fast sailing pace was short lived. Their fast clipper ship, *Neptune's Car*, ran out of winds. They sat in the doldrums with San Francisco less than a week away. Mary took this with great patience, but also worried about her husband. He needed to see a doctor soon. Mary was afraid he would die out there at sea. For ten long days, the ship lagged off San Francisco with limp sails under the heat of the sun. Finally a light breeze came up and they were able to move slowly to the San Francisco port. Mary Patten noted in the ship's log that the trip had taken 120 days. As it turned out, she beat three of the competing ships!

After Mary met the consignee who took the ship's cargo and turned over the ship's manifest, she arranged to have Captain Patten moved to the Oriental Hotel and sent for a doctor. The San Francisco newspaper reporters interviewed her and wrote the story in the papers. All of the publicity helped raise funds to permit the Pattens to return to Boston on the steamer, *George Law*. The insurance officers of *Neptune's Car* voted to send a donation of

\$1000 and a complimentary letter to Mary Patten for her heroic work in bringing the fast sailing clipper ship safely around the dangerous Cape Horn.

When Mary and Captain Patten returned to New York City, they stayed at a hotel for a couple of weeks because Captain Patten was still in critical condition. Soon it became apparent that Captain Patten would not survive his illness. The news reporters were everywhere. Leaders of the Feminist movement in Boston made the most of Mary's heroism. She was asked to join the movement and make personal appearances in the behalf of Woman's Rights.

Poor Mary was so tired from the ordeal that she could not do anything. She had her baby, Joshua Adams Patten, on March 10, 1857. Her husband, Captain Patten, suffered for months and died in Somerville, Massachusetts on July 25, 1857.

A fund of \$1400 was raised to help Mary and her baby, but she never fully recovered from the ordeal herself. She died four years later at the age of 24. She may have gotten typhoid fever and tuberculosis because she was so run down from her terrible voyage.

To this day, Mary Patten remains a heroine of the sea and she is one of the most famous women in maritime history. It was because of her bravery, skill at navigation, and determination that she saved her ship, crew, and husband on that dangerous voyage in 1856.

In the New York Daily News on March 18, 1857, the crew gave this account of the journey: "They sustained her well, giving her their whole hearted power and support. They looked with pity and reverence on her as they saw her through the cabin windows at her desk, keeping the reckoning and making entries in the ship's log. Each day the sky was clear, Mary was on deck taking navigational readings. She marked the charts, made no mistakes, and carried the ship forward in the best condition. She studied the medical books on board and never left her husband day or night except to perform his duties."

- Do you think Mary Patten was brave? Why?
- What would you have done if you had been in Mary Patten's shoes?
- Can you think of anyone today who has shown a similar kind of bravery?
- Have you ever had to continue to be brave in spite of great challenges?

Maritime Artifacts: How Do Ships Navigate from Place to Place?

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Source: San Francisco Maritime National Historical Park, SAFR 17752.
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Compass

A compass helps the navigator determine and stay on course. This seagoing compass has a leveling device called a gimbal that allowed it to remain steady at sea when the ship hits rough waters. Traditional compasses were marked with 32 points instead of 360 degrees. This compass is from the steam lumber schooner, *Cleone*.



Source: San Francisco Maritime National Historical Park, SAFR 9931.
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Parallel Rule

The parallel rule is a tool used to navigate when using a navigation chart.



Source: San Francisco Maritime National Historical Park, SAFR 9931.
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Dividers

Dividers were used to measure distance on a chart. A scale on the boarder of the chart indicated nautical miles and fractions. With the divider legs adjusted to represent a given length, the number of units between given points could be easily measured.



Source: San Francisco Maritime National Historical Park, SAFR 17518.
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Sextant

The sextant was used in celestial navigation to determine a ship's position by measuring the angle of the heavenly bodies above the horizon. This Scottish instrument was reportedly used aboard the Park's ship *Balclutha*.



Source: San Francisco Maritime National Historical Park, SAFR 8716.
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Long Glass

Sailors used their *long glasses* to identify landmarks or approaching vessels. This telescope from the late 1800s belonged to Captain Leighton Robinson.



Source: San Francisco Maritime National Historical Park, SAFR 14391.
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Shipboard Clock

A clock salvaged from the Captain's cabin of the tanker *Lyman Stewart*.
Life at sea was an endless progression of four-hour shifts or *watches*.

Standards Based Activity: How Do Ships Navigate from Place to Place?

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Activity Process and Outcome

Students read the Navigator story and research further information about the history of navigation using materials from the suggested web sites. Students will answer the questions on the board in a class discussion before breaking into their small groups to compare how they would navigate their course from home to school with how the sea captains navigated their course from Boston to California by sea.

Finally, students work in small groups to create individual navigation logs that document the routes between their homes and school. Each student will create his/her own log and use the group as resource.

Activity Objective

Students will examine how they navigate a familiar trip between home and school. They will compare their own form of navigation to that of the characters in the story.

Instruction

1. Print and distribute the story, *A Guide Through the Seas*, for students to read.
2. Suggest the following web sites to read for further research on the history of navigation.
3. Write the following two questions on the board and start a class discussion based on them.
 - List the differences between navigating on land, where there are landmarks, and navigating at sea when sometimes the land is out of sight?
 - At sea what takes the place of landmarks?

Some possible answers are:

On land

- One must follow the streets.
- Use street signs, traffic lights, and stop signs to find your way.
- Use landmarks to help find the way.
- Use a compass to determine direction of travel.
- Use a road map.

At Sea

- Site longitude and latitude using a Sextant.
- Set course and heading according to longitude and Latitude.
- Set course with regard to prevailing winds and currents.
- Use a long glass to site land and other objects to help site bearings.
- Use a compass to determine direction of travel.

4. Create a navigation log

Students create a navigation log that details the journey between their home and school. Each student should create his/her own log and consult the group for support and assistance. If they ride a bus or ride in a car to school, they should describe the navigation route taken by the vehicle driver.

5. Students share their navigation routes

Ask students to pair up and describe their navigation routes between home and school with their partners. Ask students to compare the differences between navigating by land and navigating by sea.

Quick Assessment

Navigation logs should include:

- Major streets
- Signs
- Landmarks
- Direction traveled (N,S,E,W)
- Weather Conditions (rain, snow, sun, etc.)
- Wind velocity and direction
- Speed of travel
- Date and time observations were taken

California State Content Standards for Public Schools

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The following standards correlate to this unit.

Navigator

HISTORY STANDARDS

Historical and Social Sciences Analysis Skills Grades K-5

Chronological and Spatial Thinking Chronological and Spatial Thinking

2. Students correctly apply terms related to time, including *past*, *present*, *future*, *decade*, *century*, and *generation*.
3. Students explain how the present is connected to the past, identifying both similarities and differences between the two, and how some things change over time and some things stay the same.
3. Students use map and globe skills to determine the absolute locations of places and interpret information available through a map's or globe's legend, scale, and symbolic representations.

Research, Evidence, and Point of View Research, Evidence, and Point of View

1. Students differentiate between primary and secondary sources.
2. Students pose relevant questions about events they encounter in historical documents, eyewitness accounts, oral histories, letters, diaries, artifacts, photographs, maps, artworks, and architecture.
3. Students distinguish fact from fiction by comparing documentary sources on historical figures and events with fictionalized characters and events.

California: A Changing State Grade 4

4.1 Students demonstrate an understanding of the physical and human geographic features that define places and regions in California.

- Explain and use the coordinate grid system of latitude and longitude to determine the absolute locations of places in California and on Earth.
- 4. Identify the locations of the Pacific Ocean, rivers, valleys, and mountain passes and explain their effects on the growth of towns.

4.4 Students explain how California became an agricultural and industrial power, tracing the transformation of the California economy and its political and cultural

3. Discuss immigration and migration to California between 1850 and 1900, including the diverse composition of those who came; the countries of origin and their relative locations; and conflicts and accords among the diverse groups (e.g., the 1882 Chinese Exclusion Act).
4. Describe rapid American immigration, internal migration, settlement, and the growth of towns and cities (e.g., Los Angeles).

LANGUAGE ARTS STANDARDS

Grades 4 and 5

2.0 Reading Comprehension (Focus on Informational Materials)

Students read and understand grade-level-appropriate material. They describe and connect the essential ideas, arguments, and perspectives of the text by using their knowledge of text structure, organization, and purpose. The selections in *Recommended Readings in Literature, Kindergarten Through Grade Eight* illustrate the quality and complexity of the materials to be read by students. In addition, by grade eight, students read one million words annually on their own, including a good representation of grade-level-appropriate narrative and expository text (e.g., classic and contemporary literature, magazines, newspapers, online information). In grade five, students make progress toward this goal.

Structural Features of Informational Materials

2.1 Understand how text features (e.g., format, graphics, sequence, diagrams, illustrations, charts, maps) make information accessible and usable.

2.2 Analyze text that is organized in sequential or chronological order.

Comprehension and Analysis of Grade-Level-Appropriate Text

2.3 Discern main ideas and concepts presented in texts, identifying and assessing evidence that supports those ideas.

2.4 Draw inferences, conclusions, or generalizations about text and support them with textual evidence and prior knowledge.

Expository Critique

2.5 Distinguish facts, supported inferences, and opinions in text.